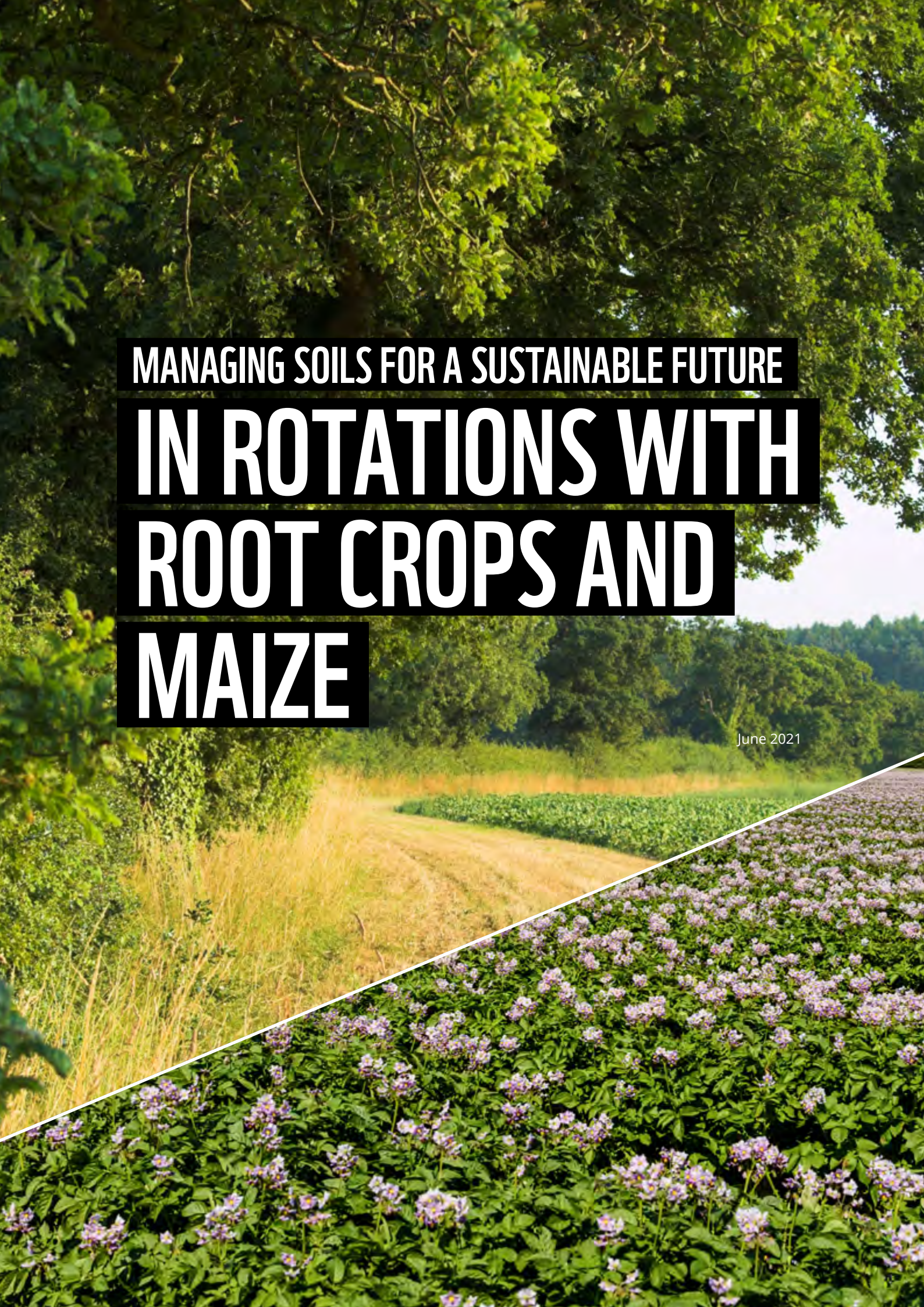

MANAGING SOILS FOR A SUSTAINABLE FUTURE

# IN ROTATIONS WITH ROOT CROPS AND MAIZE

June 2021

# FIRST STEPS FOR IMPROVING SOIL HEALTH


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Well managed and functioning soils are the foundation for all production systems.

Soils with good structure that contain diverse and abundant flora and fauna, which can provide the nutrients plants need to grow, form essential building blocks for productive farms. Such soils are best able to support good yields and reduce the risk to the environment through unnecessary losses to air and water.

There is no one-size fits all blueprint to improve soil health. Effective soil management must build on existing practice, your farming system, soil type, climate, cropping etc. There are options for all farmers to enhance both productivity and soil health.

Although managing soils well can be confusing and complex, this guide brings together some initial steps that can be implemented in rotations with root crops and maize, and will help you understand your soils and plan your first steps to improving soil health.


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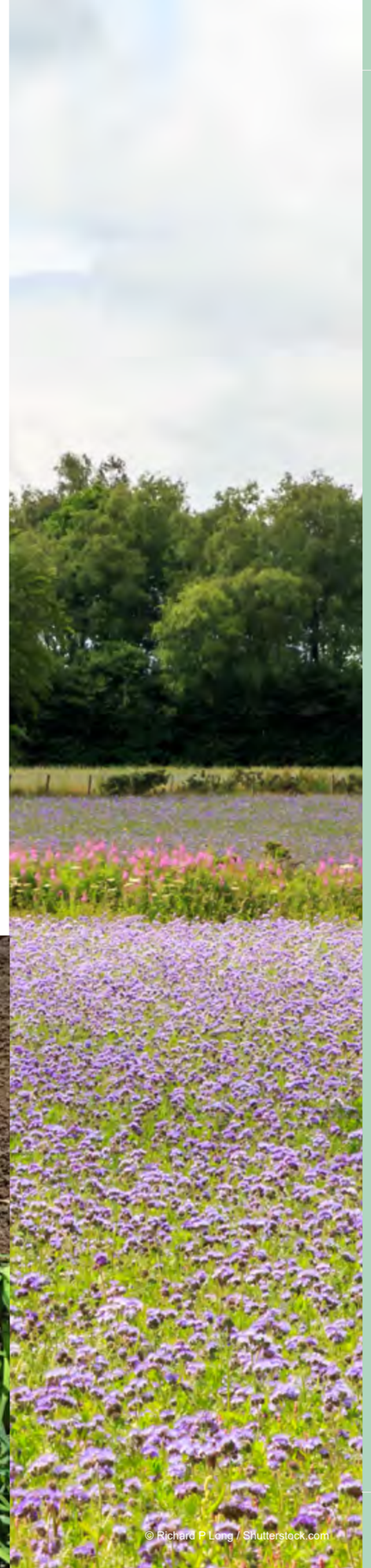
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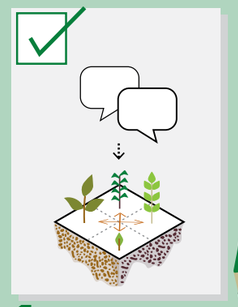
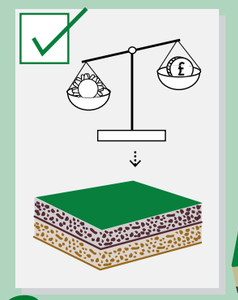
## 3 THINGS TO CONSIDER:



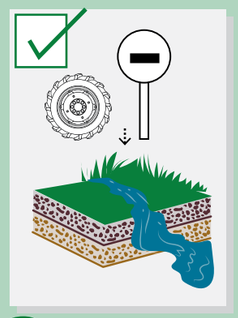
1

**FOR RENTED LAND, ENGAGE WITH THE LANDLORD ABOUT WHAT IS POSSIBLE ACROSS THE WHOLE ROTATION**



2

**PUT LONG-TERM SOIL HEALTH ABOVE SHORT-TERM PROFIT**



3

**CONTROLLED TRAFFIC APPROACHES**

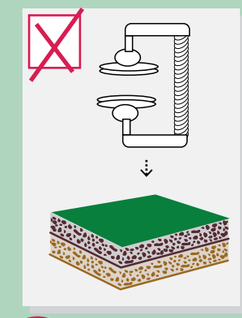
## 3 THINGS TO AVOID:

1

**KNOWINGLY BREAK THE LAW E.G. EXCESS N APPLICATIONS**

2

**ALLOW SOIL EROSION FROM FIELDS OR PART FIELDS**



3

**WHENEVER POSSIBLE, DON'T CAUSE TOPSOIL OR SUBSOIL COMPACTION**

| | WHERE YOU WANT TO IMPROVE SOIL HEALTH | |
|---|---|---|
| | **EVERYONE SHOULD:** | **GOING BEYOND THE NORM MIGHT MEAN:** |
|  <br>**KNOW YOUR SITE AND SOILS**<br>Understanding the soils you have across your land, and how factors such as slope and proximity to watercourses can influence risks to soil, will help you manage the farm in a way that promotes soil health. Importantly, it will highlight what techniques might not suit your soils. | ☑ Know the land use constraints of the farm, and consider the impact of variability – hydrology, slope, erosion risk etc<br>☑ Know your soil texture (including subsoil)<br>☑ Understand the catchment scale context - NVZ, diffuse P risks<br>☑ Record your soil observations/ data so you can refer back to them easily | ☑ Make sure everyone on the farm understands the importance of soils<br>☑ Develop on-farm skills that promote effective management of your soils<br>☑ Spend time in peer-to-peer learning and engage in research<br>☑ Monitor the system as a whole e.g. grass production, livestock and crop quality, water quality etc and use the information<br>☑ Need to consider soils across the whole rotation - introduce practices to increase resilience for the more difficult cropping phases |
|  <br>**CROP MANAGEMENT**<br>Having more crop rotations can support soil health improvement. Crops that support/replenish soil structure, organic matter and nutrient balance within a rotation will help improve your soil. | ☑ At least three crop rotation<br>☑ Ensure the rotation is long enough for soil-borne pest management<br>☑ Manage nematode risk<br>☑ Appropriate varietal choice, particularly early maturing varieties | ☑ Targeted fungicide, herbicide and fertiliser applications – use precision approaches<br>☑ Maximise cropping diversity - extend the rotation<br>☑ Don't use high risk fields for high risk crops<br>☑ Improve cropping system design to support pollinators and predators of crop pests<br>☑ Use cover cropping to improve soil structure and manage pests<br>☑ Introduce trees as shelter belts, hedges and consider integrating agro-forestry |
|  <br>**OPTIMISE NUTRIENT MANAGEMENT**<br>Understanding your existing soil nutrient levels will help to apply the right nutrients in the right quantities. This will ensure optimum growth as well as reduce risk of losses. Ultimately good nutrient management saves both time and money, ensuring good returns while controlling pollution. | ☑ Use soil testing regularly to optimise fertiliser and lime use (pH, P, K, Mg)<br>☑ Maintain pH (liming / gypsum as needed)<br>☑ Use robust information to aid nutrient planning e.g. RB209<br>☑ Match fertiliser type to soil type to increase N use efficiency and minimse NH3 emissions<br>☑ Select best practice application methods to match manure/organic material and soil types | ☑ Implement enhanced monitoring of soils - not just pH, P, K - and use the information<br>☑ Take a wider approach to crop nutrition than just NPK |





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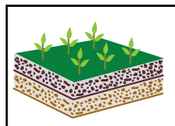
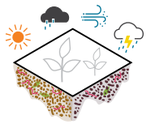
|  <br>**IMPROVE SOIL PHYSICAL CONDITION**<br>Well structured soils will usually be free draining and support good plant growth. Soils which are free from compaction can help minimise the impacts of flooding and drought, and will help to reduce soil erosion and the loss of your soils. | ☑ Ensure drains are present and maintained where needed<br>☑ Assess soil structure regularly using visual inspection methodologies such as VESS<br>☑ If you cause damage, put a remediation plan in place<br>☑ Use lightweight vehicles wherever possible<br>☑ Minimise compaction - use appropriate tyres and tyre pressures<br>☑ When cultivating, assess soil conditions regularly and stay within the workability window<br>☑ Minimise / optimise cultivation intensity - you will need flexibility season by season<br>☑ Ensure you have appropriate storage to allow some harvesting flexibility<br>☑ Take a targeted approach to address compaction directly through sub-soiling as needed in the right conditions | ☑ Use in-season weather and soil monitoring to allow good risk assessment for harvest operations<br>☑ Ground penetating radar may be able to be used to identify deeper compaction and target subsoil/compaction management<br>☑ Consider controlled traffic approaches<br>☑ Consider variable depth cultivations |
|  <br>**MANAGE RUN-OFF IN THE FIELD**<br>Water flowing across your fields is the primary way that soil erosion will occur. It will also transport nutrients and pesticides away from where they are of most value to you. Taking action to reduce run off helps avoid all these losses and keeps the soil where it is most useful to you – in your field. | ☑ Incorporate designed buffer strips alongside watercourses, ditches and hedges<br>☑ Minimise run-off /erosion risk through consideration of the direction of cultivation<br>☑ Capture runoff and sediment in field | ☑ Minimise run-off erosion risk through direct drilling/strip tillage and/or under-sowing<br>☑ For maize, oversow with grass to provide soil cover at / after harvest<br>☑ For potatoes, planter with dyker to divot the furrow and prevent run-off<br>☑ Consider the links to streams, ditches and other waterways and break the pollution pathways where possible |



## MAINTAIN SOIL ORGANIC MATTER AND BIOLOGICAL ACTIVITY

Soil organic matter and biology are crucial to many aspects of soil health. They help the physical and chemical processes in the soil, making it more resilient to waterlogging, compaction and also support better nutrient cycling and availability.

- ☑ Keep soil covered during the winter period, wherever possible – no bare ground
- ☑ Incoporate crop residues wherever possible or return via manures
- ☑ Add off-farm organic matter (sludges, digestate, compost)
- ☑ Make OM measurements - understand results and respond through action
- ☑ Track your own biology - count earthworms

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The information in this leaflet is generated from a workshop which involved: ADAS, Agrovista, AHDB, AIC, Agrii, Anglian Water, British Grassland Society, Centre for Ecology and Hydrology, CF Fertilisers, CLA, Cranfield University, East of England Agricultural Society, Environment Agency – soils, Gs Growers, Game and Wildlife Conservation Trust, Hillcourt, Hutchinsons, Innovation for Agriculture, James Hutton Institute, Lancrop/Yara, NIAB, NFU, National Trust, Natural England – Catchment Sensitive Farming, Organic Farmers and Growers, Royal Agricultural University, SRUC, SectorMentor, Sustainable Soils Alliance, and the Universities of Lincoln and Sheffield.

The workshop was made possible thanks to generous funding from **Anglian Water.**

Working together

**WWF** is one of the world's largest independent conservation organisations, active in nearly 100 countries. Our supporters – more than five million of them – are helping us to restore nature and to tackle the main causes of nature's decline, particularly the food system and climate change. We're fighting to ensure a world with thriving habitats and species, and to change hearts and minds so it becomes unacceptable to overuse our planet's resources.

**WWF. For your world. For wildlife, for people, for nature.**

Find out more about our work, past and present at wwf.org.uk

With food production at the centre of many environmental issues, WWF-UK and **Tesco** have come together with a shared ambition: to make it easier for customers to access an affordable, healthy and sustainable diet. Through the partnership we aim to halve the environmental impact of the average UK shopping basket. In order to deliver this, we are focusing on three key areas: helping customers to eat more sustainably, restoring nature in food production and eliminating waste.

To learn more about the WWF-UK and **Tesco** partnership, and our work on sustainable agriculture, at www.wwf.org.uk/basket-metric

**CFE:** Encouraging farmers and land managers to protect and enhance the environmental value of farmland alongside productive agriculture.

Protecting wildlife, protecting natural resources, enhancing biodiversity.

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Championing the Farmed Environment partners – Agricology, Agricultural Industries Confederation, Agriculture and Horticulture Development Bord, Anglian Water, Association of Independent Crop Consultants, BASIS, British Grassland Association, British Grassland Society, Bumblebee Conservation Trust, Catchment Based Approach, Catchment Sensitive Farming, Country Land Alliance, Crop Protection Association, DEFRA, Environment Agency, Farm Advisory Service, Farming and Wildlife Advisory Group, Game & Wildlife Conservation Trust, Hedgelink, Institution of Agricultural Engineers, Linking Environment and Farming, National Farmers Union, National Institute Agricultural Botany, Natural England, Natural England, Nature Friendly Farming Network, Tennent Farmers Association, The Central Association for Agricultural Valuers, The Woodland Trust, Tried & Tested, Voluntary initiative.

**The Soil Health initiative** aims to bring together the wealth of understanding of soil health and management to help farmers improve their soil health and thus productive farming alongside environmental benefit.

**All six soil health guides, covering most of the UK agricultural sector, can be found at**
cfeonline.org.uk/environmental-management/soils/uk-soil-health-initiative-guides/

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